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1938

March 2, 1938

ANNUAL REPORT TO THE CHIEF OF THE FOREST SERVICE OF THE PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION FOR THE CALENDAR YEAR 1937

CONTENTS

	Page
Director's Statement	1
Project Status Sheets	
Silvics	
Silvicultural Investigations	8
Mensuration Investigations	15
Regeneration Investigations	19
Fire Protection Investigations	22
Range	
Grazing Management	25
Forest Products	
Timber Harvesting and Conversion Investigations	29
Forest Products Statistics	32
Seasoning and Physical Properties Investigations	33
Forest Survey	34
Forest Economics	
New Public Domain Investigations	36
Taxation Investigations	39
Private Forestry Investigations	41
Flood Control Surveys	45

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DIRECTOR'S STATEMENT

Introduction

The forest problems of the Pacific Northwest cover practically the entire range of forest problems to be found anywhere in the United States. The diversity of forest tree species and of forest types, the variety of uses to which the forests are put, the activity in forest exploitation, the conflicts in land uses, the acuteness of economic and social aspects interwoven with forest ownership and industrial life, all combine to make an array of problems whose solution is urgent. It is obvious that the Station's current program does not begin to include even the most pressing of these.

This region is fast evoluting from the pioneering stage to a more mature stage in its social and industrial development. In certain parts of the region forest resources are almost untouched; in other districts the bulk of the virgin resource has been exploited, forest industry has had its day of ascendancy and is now on the decline. There is here, therefore, the opportunity to study the whole cycle, both physical and economic, of forest exploitation and to devise both preventives for bad practices for the virgin area, and remedies for the damage that has already been done on exploited areas.

Silvics

The introduction of partial cutting methods in the Douglas fir region has brought up a host of new problems in silviculture, mensuration, and protection. Previous work has been directed chiefly to the management of the types of this region by clear cutting. Now the private operator is practicing, in many places, a zero-margin cutting, the final consequences of which are not known but which obviously should be modified to be acceptable silviculture. On the national forests experiments with light cutting are being made, but much study is necessary to determine the results of this method upon stand structure, forest health, growth, and fire hazard, and the conditions under which this method, or modification of it, should be used. During the last two years silvicultural studies have been directed to partially cut stands, but not to the extent that the importance of the problem warrants.

In the pine region large-scale experiments with the maturity selection system have been under way. This system of cutting is the fruition of years of research by this Station and points the way for revolutionary improvement in ponderosa pine management in this and other regions, on both private and public lands. The demands for follow-up research and advisory work to properly introduce this method into practice are many and cannot be fully met with present facilities.

The basic work in mensuration which this Station has been doing for years has been invaluable in conducting the growth phase of the forest survey; this has been the big task for the forest mensurationist the last two or three years. That nearly done, the job ahead is growth and yield studies for partially cut stands in the Douglas fir region, quality yield tables, and volume and growth studies of the secondary species.

In the field of fire studies a major contribution of the year was the perfecting and large-scale trial of a fire-danger board that promises to mark another significant forward step in forest protection technique. Other fire studies were largely shelved the last part of the year in order to conduct the research phases of the fire-control replanning project upon which five assistants to the Station staff men have been employed, mostly with funds from the Regional Forester's office.

The study of slash disposal following clear cutting in the Douglas fir region, begun in 1928, has come to the report stage, and a publication has been prepared that should help to improve this most important phase of land management.

The field of regeneration research is hardly being touched by the Station; some studies in this category are being carried on by the Regional Forester's office but not to the extent warranted by the complexity of the problem. No new genetics work of importance has been undertaken for years, though tests of both Douglas fir and ponderosa pine are currently maintained. The first yielded a department circular during the year.

The assignment to the Station by the Biological Survey of a forest biologist makes possible a study of some of the perplexing relationships between animals and natural and artificial reforestation

The facilities of the Division of Silvics are wholly inadequate to meet the problems of silviculture, fire protection, mensuration, regeneration, etc., which this complex region presents, nor are they at all commensurate with the importance, viewed nationally, of this region. The current work in the maintenance of going experiments and in the necessary service work corollary to the research function absorbs nearly all the time of the present staff, leaving very little for new projects. It is going to be difficult, therefore, to meet the new problems mentioned above until the staff is enlarged, unless the basic long-time studies and plot work are neglected, which does not seem at all advisable. Even now the office work in the preparation of progress reports for publication is lagging in some projects.

Forest Survey

The forest survey of the Douglas fir region culminated with the completion of the regional analytical report, soon to be published. Since the first preliminary results were published survey findings have been widely used in many phases of land use management and industry. Forest land management in this region is approaching the crossroads; changes in industrial practice and legislative action of far reaching significance are imminent. Unless these are predicated upon reliable basic data regional adoption of sustained-yield management may be retarded many years. This emphasizes the necessity for keeping the survey data up to date so that policies and plans of procedure may always be based upon facts. Two of the counties in which exploitation has been rapid were resurveyed in the field and several more will be done in 1938.

The field work and practically all of the basic computations on the inventory, growth, and depletion phases have been completed for the ponderosa pine region and now the survey is entering its most important phase, that of analyzing and interpreting the data. Preliminary statistical reports and maps already published are being used by many and varied agencies.

Forest Economics

Forest Fire Insurance. The publication, during the early part of the year, of the results of the comprehensive study of forest insurance possibilities and technique in the Pacific Northwest paves the way for an insurance undertaking. Some promotional work to this end was done in cooperation with the Regional Forester's office.

Forest Land Economics. Land use planning, land classification, tax delinquency, and the instability of forest land ownership are very live subjects in this region. Several agencies are in the field studying these subjects, largely from the point of view of agricultural uses. The Station has tried to keep in touch with whatever studies were being made in order that the standpoints of forest use, of the forest industries, and of the forest owner would be adequately considered. This cooperation takes considerable time of the one man in this section, but yet forest research is not participating sufficiently in the solution of these broad land problems. The specific topic of forest land tax delinquency and abandonment in the Douglas fir region has practically reached the publication stage.

A most troubling threat to the integrity of plans for sustained-yield management is the approval given by agricultural interests to converting forest lands in the western part of the region to grazing use at the expense of the forest cover. The determination of highest use involves nice questions of ecology, economics, and social welfare; it is most to be desired that all agencies of the Department of Agriculture make a united and harmonious approach to the subject and that the forest aspects of these problems be adequately and intelligently studied.

Taxation. As a follow-up of the forest taxation inquiry studies of representative forest counties are being made to determine how reorganization of local government might help to stabilize and equalize taxation. Forest tax reform is a very live topic especially in legislative years and the Station is able to contribute much factual information and advice to promote intelligent action toward this desirable objective.

Logging Economics. The revolution in logging methods which is now going on in the region as a consequence of the general use of trucks and tractors gives an opportunity, or rather an obligation, to study ways and means of using these new tools for better forest practices. Partial cutting of some sort is being employed in every type where mobile, flexible machinery can be used. In many cases the methods are inimical to forest welfare; elsewhere some form of partial cutting seems to be an actual panacea for forest ills. It is a most complex problem to determine the form of cutting that is consistent with good forest management and protection and at the same time economical, sound, and practicable of adoption by the private operator. Progress is being made all the time in the better understanding of selective logging technique in both the fir and pine regions, but the demands for technical studies and the opportunities to give real leadership in this new trend in logging engineering and timber management far exceed the Station's ability to satisfy. This section is now manned by but one man, whose capacity is greatly handicapped for lack of an assistant; he should have several. In a region that supplies over a third of the nation's lumber cut it is wholly out of reason to have but one man cover the whole field of research in logging engineering and logging finance at this Station.

Forest Products

The Division of Forest Products continued to serve as a very valuable liaison between the Forest Products Laboratory and the public. Beside conducting its own research program it serves as a bureau of information, which is most important in a region where the forest industries are of such magnitude and diversity.

The maintenance of the current statistical work and serving the public with the technical information it requires is no small part of this Division's work. The principal project of the past two years has been making mill production studies in the ponderosa pine region as a part of the larger study of selective timber management. The results have been most significant and have found ready use and application both on the national forests and by the owners of private timberland. This field of study has been satisfactorily covered but similar work remains to be done in the fir region. Another task ahead in forest products research is a study of the requirements and availability of raw materials needed by selected forest industries, such as the plywood industry. The whole field of utilization of by-products, of woods and mill waste, and of the secondary species presents an almost limitless and promising field for research.

Range Studies

This Division is new at the Station this year. Its first big task has been participation in the Western Range Survey; directing the corps of temporary assistants in the covering of some 12 million acres has taken much of the time of the regular 2-man staff. In the research program of this Division attention is being directed largely to laying a solid foundation by working out methods of studying range problems. The major grazing territory of this region is east of the Cascade Range and here within the forest zone most of the range studies will be concentrated for the time being. However, west of the Cascade Range the problems of grazing use on logged-off and burned-over lands are acute and far-reaching in their implications, as indicated under Land Economics above.

Flood Control

This Station has as yet no Division of Forest Influences, and practically no research in this field has been done in this region. East of the Cascade Range, where water is at a premium for irrigation, outstanding problems include the influence of various methods of range and forest management on the regimen of streams, and the relative water requirements of various cover types. West of the Cascade Range, where precipitation is heavy and where great quantities of water are required for generation of power and for domestic use, information is greatly needed as to the influence of various methods of forest management on regularity of streamflow and on flood prevention. Questions on all these subjects are at present unanswerable.

In accordance with provisions of the Flood Control Act this Station has devoted much time to joint public hearings with the Army Engineers for consideration of flood-control activities on 17 watersheds, and has collaborated with the Soil Conservation Service and the Bureau of Agricultural Economics in preliminary studies and reports on the land-management phases of flood control on a few of the many watersheds assigned to it.

Significant Achievements of 1937

The activities of the year may well be epitomized by citing the more significant achievements in each of the Divisions.

The logging of seven test plots of 60 to 100 acres each in mature ponderosa pine on the Pringle Falls Experimental Forest, and the collection of a large amount of data on the economics and silvics of different methods of cutting.

The Pringle Falls field meet in early October, attended by over 60 lumbermen and foresters, was a high light of this year's work for two major Station projects, namely, logging economics and pine silviculture. The meeting was sponsored by the Western Pine Association to give timber operators an opportunity to study the results of the seven variations of selective cutting on the experimental forest.

Addition of the Lookout Mountain Unit of 3,500 acres of immature ponderosa pine to the Pringle Falls Experimental Forest, and development work started.

The extension of the transportation system on all five experimental forests by the construction of about 9 miles of road and 30 miles of trail, which will help greatly in making these areas accessible for administration, protection, and demonstration.

Construction of headquarters buildings and other improvements on the experimental forests from emergency funds. This completes the major immediate needs on all five areas.

Establishment of a natural area of 1,122 acres on the Port Orford Cedar Experimental Forest.

Reexamination of the Tillamook burn four years after the fire to determine the status of reproduction, and a report prepared.

The addition of six "poisoning" plots to the stand improvement study in defective old-growth Douglas fir-hemlock stands on the Wind River Experimental Forest, thus completing the establishment of 30 one-acre plots which aim to restore declining stands to a growing condition by cutting, girdling, and poisoning living defective trees.

The establishment of eight stand improvement and growth plots in the red alder type at the Cascade Head Experimental Forest, marking the beginning of a study of the silvicultural phases of management of this, our most important hardwood type in the Douglas fir region.

Designing, assembling, and putting into practical use over 100 fire-danger boards on all ranger districts in R-6 and on lands of several cooperating agencies, and making a critical analysis of the season's experience.

Preparing the working plan for the fire control replanning project for the national forests of R-6, and supervising the necessary basic statistical studies.

An analysis of the local governmental organization, financial structure, and land ownership pattern of three counties in western Washington with special reference to opportunities, through governmental reorganization and disorganization, to economize and to make property taxes on forest lands more predictable.

Contributions in many forms, largely in cooperation with other agencies, toward a solution of land-use problems, with special reference to tax delinquency, disposition of tax-forfeited lands, valuation of forest lands for tax purposes, and rural land classification.

Completion of the forest survey comprehensive report for the Douglas fir region.

Completion of the basic office computations for the inventory phase of the forest survey of eastern Oregon and eastern Washington.

Publication of forest statistics for ten eastern Oregon and eastern Washington counties, completing the series of forest survey county reports for Oregon and Washington.

Initiation of a program to keep forest survey inventory data in the Douglas fir region up to date. Completion of inventory field work in Clatsop County, Oregon, and Grays Harbor County, Washington, represents the first step in the revision of timber type and volume data.

Analysis of the results of 40 percent maturity selection cuttings on a 10,000-acre experimental area on the Malheur National Forest, undertaken to test the conclusions of the so-called "Burns Study", which verified the prediction made in that study and convincingly demonstrated the economic and silvicultural advantages of light cutting.

Analysis of selective timber management of timber areas tributary to the Kinzua Pine Mills according to which important financial and silvicultural gain can be made by changing from heavy to light cutting.

Demonstration marking of light maturity selection on the operations of the Brooks-Scanlon Lumber Co. and the J. Neils Lumber Company, followed by mass tests of comparative lumber grade recoveries and production costs.

Continuation of ponderosa pine mill analyses with two studies at Bend, Oregon, to provide data on grade recovery expectancies of central Oregon timber.

Selection for biennial examination of 1,100 telephone poles treated with Anaconda Paste Preservative in eleven Forest Service lines.

Completion of field work on an intensive analysis of farm wood requirements for buildings, posts, poles, etc.

Initiation of the range studies program by an investigation of range research methods and range utilization in the Blue Mountains.

Cooperation on the Western Range Survey through coordination of the surveys made by various agencies and compilation of data for 5,180,000 acres of range land in Oregon and Washington, 1,319,000 acres of which were assembled into final forage type maps.

Holding of 17 joint hearings in cooperation with the U. S. Army Engineers, completion of the preliminary report on Lewis River, Washington, and progress on preliminary reports for three other streams in cooperation with the Soil Conservation Service and the Bureau of Agricultural Economics, all part of the program authorized by the Flood Control Act of 1936.

R-NW
M-1
(Includes former project M-1
Selective Logging)

Continued

February 1938

SILVICULTURAL STUDIES OF VARIOUS TYPES IN THE DOUGLAS FIR REGION

FIELD DIVISION: Silvics

WORK PROJECT: Silvicultural Investigations

FUNCTIONAL PROJECT: Silvicultural Investigations

LINE PROJECT: Silvicultural Studies of Various Types in the Douglas Fir Region

PURPOSE OF WORK: To collect basic silvicultural facts regarding the various species and types that occur within the Douglas fir region, to form a foundation upon which to build sound management plans. The studies must be sufficiently far-reaching to make possible the formation of management plans for both clear cutting and selective logging.

REVIEW OF PAST WORK: Studies have been made on (a) seed production, dissemination and life of seed after it falls, (b) physical and biological factors that govern seedling establishment after slash fires, (c) regeneration after crown fires and slash burns, (d) effect of slash burning on the forest soil, and (e) a survey of the condition of residual stands on areas that received some sort of partial cutting. Studies under phases (a) to (c) made prior to 1924 are summarized in U.S.D.A. Bulletins 1200 and 1493 and since that date in "Handbook of Forest Practices", "The Forest Soil of the Douglas Fir Region and Changes Wrought Upon It By Slash Burning" (Ecology, April 1937), and various other short publications and manuscripts. In connection with selective logging (e) 37 temporary plots were established on cut-over areas and 13 permanent plots put in on national forest areas to be logged.

ACCOMPLISHMENTS DURING PAST YEAR: Work was continued on uncompleted phases of all studies (a) to (e) listed above. "Seedling Establishment in Relation to Certain Environmental Factors on Logged Lands in the Douglas Fir Region" was sent to the printers as a U.S.D.A. Circular. A technical bulletin, "Natural Regeneration in the Douglas Fir Region", has advanced to rough draft form. In connection with the selective logging studies, file records have been worked up and preliminary summaries prepared for the 37 partially cut areas sampled and the 13 permanent sample plots on areas to be cut over.

PLANS FOR NEXT YEAR: A technical bulletin to be completed. Permanent sample plots reexamined, particularly those in connection with selective logging. Continue uncompleted seed, reproduction, and environmental studies, particularly their extension to the spruce-hemlock type. If possible make experimental selective logging sales in the Douglas fir type at Wind River Experimental Forest and in the spruce-hemlock type at the Cascade Head Experimental Forest. Cooperate with Logging Economics Section and the Division of Forest Management (R.O.) on silvicultural phases of selective logging operations.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Isaac in cooperation with Briegleb on mensurational phases and Matthews on fire phases.

SILVICULTURAL STUDIES IN THE PONDEROSA PINE REGION

FIELD DIVISION: Silvics.

WORK PROJECT: Silvicultural Investigations.

FUNCTIONAL PROJECT: Silvicultural Investigations.

LINE PROJECT: Silvicultural Studies in the Ponderosa Pine Region.

PURPOSE OF WORK: To determine the principles which are basic to good silvicultural practices in the pure pine and mixed conifer forest types in the ponderosa pine region.

REVIEW OF PAST WORK: This study has been a major project since the Station was organized in 1924 and was also worked upon as an administrative study for a good many years before that by the national forest organization. As a result there are available numerous detailed records and a large number of permanent test plots. Two 10,000-acre experimental forests were, to a large part, selected for this project. The tests conducted on the growth and development of forests under various conditions and treatments are long-time projects that require many years of effort before yielding results. These results as they became available have been analyzed and published.

ACCOMPLISHMENTS DURING PAST YEAR: The logging of 7 test plots of 60 to 100 acres each in mature ponderosa pine on the Pringle Falls Experimental Forest was completed late in the summer of 1937. On these test areas over 20,000 trees were tagged and measured and their value and growth rate studied. The physical factors measurements at Pringle Falls Experimental Forest consisted in taking air and soil temperatures, soil moisture determinations, and recording the development of tree seedlings throughout the growing season on 3 sites. Permanent method of cutting plots with more than 3 thousand milacre quadrats were measured as in previous years.

PLANS FOR NEXT YEAR: Establishment of plots or transects on experimental areas of maturity selection cutting for long-time follow-up of results. Field work, including reexamination of the permanent methods of cutting plots, will be continued as in the past but will be limited to the most essential phases, so as to make available more of the project leaders' time for analysis of data and the preparation of progress reports.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Kolbe.

SILVICULTURE OF THE RED ALDER TYPE

FIELD DIVISION: Silvics

WORK PROJECT: Silvicultural Investigations

FUNCTIONAL PROJECT: Silvicultural Investigations

LINE PROJECT: Silviculture of the Red Alder Type

PURPOSE OF WORK: To determine basic silvicultural principles needed for the management of red alder in pure stands or in mixture with conifers.

REVIEW OF PAST WORK: U.S.D.A. Bull. 1437 by H. M. Johnson, giving general information about the forest characteristics of red alder, was published in 1926. The possibilities of direct seeding with alder were demonstrated in connection with other seeding studies by Isaac. The technique of nursery and field planting has been worked out by Kummel, also some field plantings for firebreaks have been made. At the Cascade Head Experimental Forest 3 growth plots have been established in pure stands and several plots in mixture with conifers. Also one plot each has been established for thinning, for thinning and pruning, and for release from coniferous reproduction.

ACCOMPLISHMENTS DURING PAST YEAR: A release cutting sample plot and a check plot were established, reducing stand density to 8 x 8 spacing in a 13-year-old stand.

PLANS FOR NEXT YEAR: If funds are available study should be extended to site requirements, regeneration, and stand improvement, particularly thinning and crop tree pruning. Work should center at the Cascade Head Experimental Forest and if a sale can be made the study should include methods of cutting.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Isaac.

STAND IMPROVEMENT IN THE FOREST TYPES OF THE DOUGLAS FIR REGION

FIELD DIVISION: Silvics.

WORK PROJECT: Silvicultural Investigations.

FUNCTIONAL PROJECT: Silvicultural Investigations.

LINE PROJECT: Stand Improvement in the Forest Types of the Douglas Fir Region.

PURPOSE OF WORK: To determine best stand improvement practices (other than actual harvest cuttings) in the types of the Douglas fir region. It includes cleaning and liberation cuttings in saplings, thinning and pruning in young growth, and stand improvement in old-growth stands.

REVIEW OF PAST WORK: Work on cleaning and liberation cuttings confined to red alder type (see M-Red Alder). The Station maintains 12 and supervises 14 more thinning plots in young growth. Ten of the 26 thinned plots are pruned. Studies of stand improvement in decadent old-growth stands total 29 plots, both treated and check.

ACCOMPLISHMENTS DURING PAST YEAR: Cleaning and liberation cutting on 2 plots in the spruce-hemlock and alder types (see M-Red Alder). Pruning of crop trees on 3 plots in a 20-year-old Douglas fir plantation. Establishment of plot in 23-year-old Douglas fir natural stand to test effect of removing different percentages of the live crowns from crop trees. Extension of stand improvement study by adding 6 plots (of the 29 plots mentioned above) to test killing trees with sodium arsenite as compared with cutting or girdling. Six of the pruned plots mentioned above were put in during 1937.

PLANS FOR NEXT YEAR: Establish additional thinning, pruning, and cleaning plots, particularly in the spruce-hemlock and alder types, if funds are available. Make current examinations of existing plots. It is proposed to make a study of limb shedding and occlusion by dissecting large second-growth trees.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Briegleb on mensurational phases and Isaac on silvicultural phases.

STAND IMPROVEMENT IN THE FOREST TYPES OF THE PONDEROSA PINE REGION

FIELD DIVISION: Silvics.

WORK PROJECT: Silvicultural Investigations.

FUNCTIONAL PROJECT: Silvicultural Investigations.

LINE PROJECT: Stand Improvement in the Forest Types of the Ponderosa Pine Region.

PURPOSE OF WORK: To determine best methods of stand improvement practices in the ponderosa pine region, including thinnings, prunings, liberations, cleanings, and improvement cuttings.

REVIEW OF PAST WORK: In 1934, 8 thinning plots were established at Pringle Falls Experimental Forest and during the past ten years several such plots have been established by forest personnel on the national forests. Two plots were established in 1934 to liberate stagnated ponderosa pine.

ACCOMPLISHMENTS DURING PAST YEAR: During 1937 in conjunction with a timber sale an improvement cutting was begun on some 600 acres to remove low-grade lodgepole pine and undesirable ponderosa pine.

PLANS FOR NEXT YEAR: Complete stand improvement cuttings now under way at the Pringle Falls Experimental Forest, and start a series of plots for a test of thinning and pruning methods on the new Lookout Mountain addition.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Mensurational phases - Briegleb; silvicultural phases - Kolbe.

BOTANY - PHENOLOGY OF TREES, RANGE PLANTS, AND ASSOCIATED VEGETATION

FIELD DIVISION: Silvics.

WORK PROJECT: Silvicultural Investigations.

FUNCTIONAL PROJECT: Silvicultural Investigations.

LINE PROJECT: Botany - Phenology of Trees, Range Plants, and Associated Vegetation.

PURPOSE OF WORK: To build up a record from representative stations in the forested areas of Washington and Oregon of the time that forest trees, range plants and their associated plants vegetate, bloom, and ripen fruit. This information is useful in collecting seeds of forest and range plants, in determining the range readiness of grazing lands, the fire hazard of herbaceous vegetation, and in other problems of forest and range management.

REVIEW OF PAST WORK: Observations have been made in the Douglas fir region since 1927, and in the ponderosa region east of the Cascade Range since 1932. On each national forest in Oregon and Washington there are one or more rangers who record at weekly intervals the progress of plant growth. In addition observations are made on several experimental forests, and on the demonstration forests of the local forest schools.

ACCOMPLISHMENTS DURING PAST YEAR: A new station for observations was established on the Pringle Falls Experimental Forest. The older stations were continued as in past years, with several thousand observations recorded there by some 30 observers. A summary record was prepared for office use.

PLANS FOR NEXT YEAR: Observations will be continued at all stations. A phenological calendar will be prepared giving a summary of the observations made so far in this region.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Kolbe in cooperation with all national forests, forest schools, and others.

GENETICS - PROGENY OF SELECTED DOUGLAS FIR PARENTS AND OF PONDEROSA PINE RACES

FIELD DIVISION: Silvics.

WORK PROJECT: Forest Genetics Investigations.

FUNCTIONAL PROJECT: Forest Genetics Investigations.

LINE PROJECT: Genetics - Progeny of Selected Douglas Fir Parents, of Ponderosa Pine Races, and of Cottonwood Hybrids.

PURPOSE OF WORK: (a) To test the progeny of selected Douglas fir parents on several planting sites; (b) to test 10 regional races of ponderosa pine on several planting sites; (c) to test by field planting several hybrid cottonwoods.

REVIEW OF PAST WORK: (a) The 5 plantations, aggregating now over 11,000 pedigreed Douglas firs, established in 1915 and 1916, have been measured periodically. Progress report prepared and published as Tech. Bull. 537. (b) Six plantations aggregating 35 acres on national forests and college demonstration forests established in 1928 and examined annually. (c) One thousand hybrid poplars purchased from Oxford Paper Co. and planted for field trial.

ACCOMPLISHMENTS DURING PAST YEAR: (a) Publication and distribution of Tech. Bull. 537; (b) the plantations all given an annual examination; (c) hybrid poplar plantations at Wind River and Cascade Head Experimental Forests examined and native poplars added for comparison.

PLANS FOR NEXT YEAR: (a) Next examination in 1941. (b) Ten-year progress report to be prepared; next examination for survival, growth, and racial characteristics to be made in 1939. (c) Annual examination for survival and growth.

DATE OF COMPLETION: 20 or 30 years hence.

ASSIGNMENT: (a) Munger; (b) Kolbe in cooperation with national forest officers and forest schools; (c) Isaac.

VOLUME TABLES, ALL SPECIES

FIELD DIVISION: Silvics.

WORK PROJECT: Mensuration Investigations.

FUNCTIONAL PROJECT: Mensuration Investigations.

LINE PROJECT: Volume Tables, All Species.

PURPOSE OF WORK: To prepare standard volume tables for all commercial conifers and hardwoods of the region for which there are none.

REVIEW OF PAST WORK: Standard volume tables have been prepared for Douglas fir, ponderosa pine, Sitka spruce, western hemlock, and silver fir.

ACCOMPLISHMENTS DURING PAST YEAR: None.

PLANS FOR NEXT YEAR: Among the conifers those needing attention first are the balsam firs other than amabilis, all the cedars, all alpine species, sugar pine, lodgepole pine, and western larch. Among the hardwoods needing attention are Oregon white oak, bigleaf maple, red alder, northern black cottonwood, aspen, and the various hardwoods of southwestern Oregon. This project will be undertaken only incidental to other projects until increased funds are available for mensuration. Volume tables for special products are also needed.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Briegleb.

GROWTH AND YIELD IN THE DOUGLAS FIR REGION

FIELD DIVISION: Silvics.

WORK PROJECT: Mensuration Investigations.

FUNCTIONAL PROJECT: Mensuration Investigations.

LINE PROJECT: Growth and Yield in the Douglas Fir Region.

PURPOSE OF WORK: To collect and prepare forest mensurational data which will contribute to the knowledge of the growth and yield of the forest types of the Douglas fir region.

REVIEW OF PAST WORK: Standard even-aged yield tables have been prepared for the Douglas fir and for the spruce-hemlock types. Fifty-four permanent growth sample plots in typical even-aged stands have been established and are remeasured at 5-year intervals to provide a check on the normal yield tables. Eleven permanent sample plots have been established in stands that have been or are to be partially cut in order to provide basic data for the study of growth following partial cutting. An exhaustive regional study of growth has been completed and published as a part of the growth phase of the forest survey.

ACCOMPLISHMENTS DURING PAST YEAR: Publication of U.S.D.A. Tech. Bull. 544, "Yields of Even-Aged Stands of Sitka Spruce and Western Hemlock." Progress reports prepared for 10 plots giving the results of their remeasurement.

PLANS FOR NEXT YEAR: If funds are available the study of growth following partial cutting will be resumed. A big job ahead is the preparation of quality yield tables for the important types.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Briegleb.

GROWTH AND YIELD IN THE PONDEROSA PINE REGION

FIELD DIVISION: Silvics

WORK PROJECT: Mensuration Investigations

FUNCTIONAL PROJECT: Mensuration Investigations

LINE PROJECT: Growth and Yield in the Ponderosa Pine Region

PURPOSE OF WORK: To collect and prepare forest mensurational data which will contribute to the knowledge of the growth and yield of the forest types of the ponderosa pine region.

REVIEW OF PAST WORK: A U.S.D.A. technical bulletin providing the mechanism for predicting growth in selectively cut ponderosa pine stands has been published. A range-wide, even-aged yield study for ponderosa pine has been completed. The resulting manuscript is now in Washington awaiting publication. Three permanent growth sample plots in typical even-aged ponderosa pine stands have been established and are remeasured at 5-year intervals to reveal the detailed development of such stands. The field work for an exhaustive regional study of growth has been completed as a phase of the forest survey.

ACCOMPLISHMENTS DURING PAST YEAR: The manuscript of the even-aged ponderosa pine yield study was revised and prepared for publication.

PLANS FOR NEXT YEAR: Revised stand structure corrections for U.S.D.A. Tech. Bull. 407, "Growth in Selectively Cut Ponderosa Pine Forests of the Pacific Northwest", will be prepared. New plots will be established and old plots maintained as part of projects M-2 and Mt-2.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Briegleb.

GROWTH CYCLES IN PONDEROSA PINE

FIELD DIVISION: Silvics

WORK PROJECT: Mensuration Investigations

FUNCTIONAL PROJECT: Mensuration Investigations

LINE PROJECT: Growth Cycles in Ponderosa Pine

PURPOSE OF WORK: To determine the extent and intensity of cycles in the diameter growth of ponderosa pine in eastern Oregon and eastern Washington.

REVIEW OF PAST WORK: Preliminary investigations were made in connection with the study of growth in selectively cut ponderosa pine stands and subsequently individual ring measurements of some 400 increment cores have been made to provide basic data for estimating the normal growth rate for the growth phase of the forest survey. This study is in collaboration with Mr. Keen of the Bureau of Entomology and supplements his work on growth cycles in other parts of the region.

ACCOMPLISHMENTS DURING PAST YEAR: Practically none.

PLANS FOR NEXT YEAR: This project will not be resumed until additional computational and supervisory assistance is available for it.

DATE OF COMPLETION: After 2 years more work.

ASSIGNMENT: Briegleb

REGENERATION - NURSERY PRACTICE

FIELD DIVISION: Silvics

WORK PROJECT: Regeneration Investigations

FUNCTIONAL PROJECT: Regeneration Investigations

LINE PROJECT: Regeneration - Nursery Practice

PURPOSE OF WORK: All phases of nursery technique for growing Douglas fir and such modifications in these methods as may be required for other species.

REVIEW OF PAST WORK: The most important phase of this study during recent years has been the production of suitable grades of 2-0 root-pruned Douglas fir. This study is finished and test plots in the field were established. A second phase of the project was to determine the relative desirability of various age classes of ponderosa pine planting stock. Test plantings were made in 1931, 1934, and 1937. Study of the cultural requirements of Port Orford cedar, western hemlock, and silver fir has been initiated.

ACCOMPLISHMENTS DURING PAST YEAR: On the basis of relative development of top and roots, but without trial in the field, a comparison of two-year stock, three-year fall-grown and three-year spring-grown ponderosa pine, shows the last class of stock to be the best but varies greatly, depending on whether it is root-pruned or transplanted. Noble fir and Sitka spruce added to species, cultural requirements of which are being studied.

PLANS FOR NEXT YEAR: Test plots of three-year-old ponderosa pine will be installed in the field. Cultural requirements of Port Orford cedar, western hemlock, Shasta fir, silver fir, noble fir, and Sitka spruce will be studied.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Kümmel of Regional Office and Will of Nursery.

REGENERATION - PLANTING METHODS

FIELD DIVISION: Silvics.

WORK PROJECT: Regeneration Investigations.

FUNCTIONAL PROJECT: Regeneration Investigations.

LINE PROJECT: Regeneration - Planting Methods.

PURPOSE OF WORK: Field planting to determine (a) the best density for plantations of Douglas fir; (b) the effect of aspect, brush cover, and season of planting on survival of young trees; (c) effect of animal cropping in plantations and methods of prevention; (d) sites best suited to plantations of noble fir and silver fir; (e) the suitability of alder for planting as firebreaks; (f) the possibility of restocking cut-over lands in the fog belt by direct seeding with species having very small seeds; (g) treatment of brush areas. Some tests of little-used species are included under Fp-Exotics.

REVIEW OF PAST WORK:

(a) Density test plantations established in 1925 indicate height growth best on widest spacing.

(b) Spring planting of Douglas fir and ponderosa pine gives better survival than fall planting; also survival better on north slopes. Brush competition may choke out many trees over a period of years.

(c) Animal cropping is a serious menace to ponderosa pine planting; not so serious in Douglas fir.

(d) Test plots show noble fir survival compares with Douglas fir on north slopes but far below on south slopes.

(e) Thirteen miles of alder strips planted 1928 to 1933. Results show poor survival on dry sites.

(f) Experiments show good results with Sitka spruce, hemlock, cedar, and alder if seeded within one or two years after slash fire.

(g) Various types of road machinery have been tested in clearing lanes for planting.

ACCOMPLISHMENTS DURING PAST YEAR:

(a) A plantation of 16 x 16 spacing established.

(b) Previous findings as to superiority of spring over fall for planting ponderosa pine corroborated by additional tests.

(c) Strychnine spray found effective in first year of plantation and experiments initiated to work out methods of later control.

(over)

(f) Eighth year progress report indicates satisfactory results with spruce, hemlock, western red cedar, and red alder. New study initiated in cooperation with Biological Survey to determine seed preference of rodents; also effect of slash burning on rodent population.

(g) Five plots established by hand clearing 12' x 12' openings, staggered arrangement, 5 to 9 trees planted per opening, Douglas fir and hemlock. Additional plantings of ponderosa pine in cleared lanes gave encouraging survival. Cost of clearing lanes considerably reduced through improved technique.

PLANS FOR NEXT YEAR:

(a)-(b)-(d)-(e) Continuation of periodic examinations and measurements.

(c) Continuation of use of spray and extension of study to control methods after spray wears off.

(f) Extend study to new small-seeded species, particularly Port Orford cedar, and test use of poison with larger-seeded species in cooperation with Biological Survey.

(g) Continuation of spot clearing and additional trial of strip clearing if machinery available.

DATE OF COMPLETION:

(a) Continuous
(b) 1943
(c) Continuous
(d) 1940
(e) 1940
(f) 1948
(g) 1943

ASSIGNMENT: (a) and (f) Isaac; (b), (d), and (g), Kummel of Regional Office; (c) and (e) Isaac and Kummel, cooperation of national forest officers on all phases.

REGENERATION - TESTS OF EXOTIC SPECIES

FIELD DIVISION: Silvics

WORK PROJECT: Regeneration Investigations

FUNCTIONAL PROJECT: Regeneration Investigations

LINE PROJECT: Regeneration - Adaptability of Exotic Species to the Pacific Northwest

PURPOSE OF WORK: To test on the national forests the behavior of arborescent species of the world for forest planting and to cooperate with the arboreta of other local agencies.

REVIEW OF PAST WORK: A large number of plantations of exotic trees have been made on the national forests through the last 28 years, and the results recorded. At the Wind River Arboretum 497 lots of seed (or trees) have been planted; 130 species of conifers are now under observation.

ACCOMPLISHMENTS DURING PAST YEAR: All specimens in the Wind River Arboretum were remeasured and recorded and a progress report, which assembled the results of 25 years of tests, was prepared and distributed. Some small plantations of exotics established on Cascade Head Experimental Forest.

PLANS FOR NEXT YEAR: Maintenance of and current additions to Wind River Arboretum, to Cascade Head Experimental Forest plantations, and to national forest plantations. Assistance to cooperators.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Munger for Experiment Station; Kummel for national forest planting.

FIRE STUDIES - PRESUPPRESSION, DETECTION, AND SUPPRESSION

FIELD DIVISION: Silvics.

WORK PROJECT: Fire Protection Investigations.

FUNCTIONAL PROJECT: Fire Protection Investigations.

LINE PROJECT: Fire Studies - Presuppression, Detection, and Suppression.

PURPOSE OF WORK: To improve present techniques of the presuppression, detection, and suppression phases of fire protection.

REVIEW OF PAST WORK: Inexpensive instruments for measuring important fire weather factors have been designed and produced so that sufficient observing stations could be equipped for administration in protection organization and for research needs in studying fire climates. Knowledge of the effects of weather on fuel inflammability has been enlarged. Principles of the effect of haze upon visibility of forest fire smokes have been determined and a simple instrument for measuring this visibility has been provided for lookout use on all national forests in Region 6. A device for integrating fire weather, visibility, and occurrence factors to determine currently the total danger threatening a protection organization has been produced and put into wide use. Lightning storms as a fire cause have been studied to establish place, time, and frequency of occurrence. Man-power production of fire control lines has been studied to provide a basis for improving fire suppression organization. A technique for making forest fire fuel hazard inventories has been developed. Analyses of forest fire report data have produced necessary facts upon which to base fire control organization.

ACCOMPLISHMENTS DURING PAST YEAR: The method of integrating the weather, visibility, and occurrence factors to determine currently the fire danger was improved following a year of trial by the national forests, and an improved fire-danger board for applying the integration method was installed on each of the 100 Forest Service ranger districts and on 10 State fire protection districts in Region 6. The technique of inventorying forest fire fuels was modified for extensive use in mapping the fuels on 10 national forests according to the rate at which fires are likely to spread and the rate at which fire lines may be constructed. As a part of the fire control replanning project the analyses of fire occurrence, detection, attack, and suppression data necessary for planning adequate fire protection facilities in Region 6 was begun by the Station and carried well toward completion. In this study the principal factors affecting size on discovery, reporting time, rate of spread, and rate of constructing fire line were determined.

PLANS FOR NEXT YEAR: Fire-danger determination, statistical studies of fire records, man-power production of fire line, and continuing research phases of the fire control replanning project.

DATE OF COMPLETION: Fire-danger determination 1940. Research phases of the fire control replanning project 1939. Other phases indefinite.

ASSIGNMENT: Matthews and Morris.

FIRE STUDIES - BEHAVIOR OF GOING FIRES

FIELD DIVISION: Silvics

WORK PROJECT: Fire Protection Investigations

FUNCTIONAL PROJECT: Fire Protection Investigations

LINE PROJECT: Fire Studies - Behavior of Going Fires

PURPOSE OF WORK: Studies of going fires to furnish information on fuels, weather conditions, and other factors that influence fire behavior so as to improve the technique of fire fighting.

REVIEW OF PAST WORK: Twenty-five large fires and several small fires have been studied and the important factors of individual fires have been enumerated.

ACCOMPLISHMENTS DURING PAST YEAR: Three large fires were studied in the field and a revised plan of procedure for the field studies was prepared.

PLANS FOR NEXT YEAR: Continue observing all available fires.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Matthews and Morris.

SLASH DISPOSAL IN THE DOUGLAS FIR REGION
(Includes former project M-1 Slash Disposal)

FIELD DIVISION: Silvics.

WORK PROJECT: Fire Protection Investigations.

FUNCTIONAL PROJECT: Fire Protection Investigations.

LINE PROJECT: Studies of Fire Effects.

PURPOSE OF WORK: To determine the location and amount of fire damage, silvicultural effects of fire, and the effectiveness of fire in removing the fuel hazard after logging.

REVIEW OF PAST WORK: Fire data have been analyzed to determine the annual average extent and frequency of fires in the Douglas fir region. A large number of plots and tracts in clear-cut areas have been under observation since 1927. Partially cut stands have been studied recently in connection with the M-1 projects by means of both temporary and permanent plots.

ACCOMPLISHMENTS DURING PAST YEAR: A progress report on slash disposal following clear cutting has been prepared for publication by Munger and Matthews. Notes on slash hazard have been taken on various selectively logged plots. Some experiments in slash disposal following selective logging have been conducted as an administrative study. Considerable fire hazard rating of logged-off lands has been done.

PLANS FOR NEXT YEAR: Continued field work in partially cut stands. Putting the report on slash disposal on clear-cut areas through publication.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Munger, Matthews, and Morris.

DETERMINATION OF STANDARDS OF SATISFACTORY FORAGE UTILIZATION ON WESTERN RANGES

FIELD DIVISION: Range.

WORK PROJECT: Grazing Management.

FUNCTIONAL PROJECT: Grazing Management.

LINE PROJECT: Determination of Standards of Satisfactory Forage Utilization on Western Ranges.

PURPOSE OF WORK: In order to maintain an adequate forage supply on national forest ranges in Region 6, rangers and range inspectors need methods and standards for determining proper utilization of forage types. It is necessary to determine the degree to which each important type can be utilized by livestock and perpetuate itself, and also to develop indicators and methods for measuring this proper utilization.

REVIEW OF PAST WORK: The project was initiated at this Station during 1937.

ACCOMPLISHMENTS DURING PAST YEAR: Present emphasis is a study of methods to determine percent utilization of the Columbia needlegrass-sedge type. Work was centered in the Elkhorn Mountains on the Whitman National Forest. Results to date indicate (1) that while 100 species may occur within a management unit, 95 percent of the feed is obtained from less than 30 species, indicating that the secondary species need not be considered for determining range utilization, (2) that consistent estimates of utilization are obtained when plants are utilized less than 25 percent and more than 75 percent, (3) that more adequate methods are needed for determining the degree of utilization of plants, generally key species, that are utilized from 25 to 75 percent, and (4) that for experimental work involving intensive sampling, estimating percent utilization by volume removed gives consistent results for most species.

PLANS FOR NEXT YEAR: To complete analysis of field data already collected and, depending upon the results obtained, to extend utilization studies to other important forage types in the region.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Pickford and Reid.

R-NW
RM-2
Management of Summer Ranges
(East Side)

Continued

February 1938

DEVELOP METHODS OF MANAGING SUMMER RANGES IN MOUNTAINOUS REGIONS OF THE WEST (EASTERN OREGON AND WASHINGTON)

FIELD DIVISION: Range

WORK PROJECT: Grazing Management

FUNCTIONAL PROJECT: Grazing Management

LINE PROJECT: Develop methods of managing summer ranges in mountainous regions of the West (eastern Oregon and Washington)

PURPOSE OF WORK: To find feasible means to check the decline in grazing capacity of national-forest range land due to protracted drought and lack of knowledge of important management phases, by devising systems of range management that are best suited to livestock husbandry, natural revegetation, and maintenance of range land.

REVIEW OF PAST WORK: Prior to December 1936, when first manned, the project was limited to some ecological work on fenced quadrats.

ACCOMPLISHMENTS DURING PAST YEAR: Work centered largely on type sampling in the national forests of eastern Oregon and a comparative study of some methods used in grazing management studies and in grazing-capacity determinations. Results indicate for the square-foot-density method of measuring forage abundance: (1) individuals vary considerably in their density estimates of a single species; (2) for a single species, estimates by individuals are not compensating; are consistently lower or higher than the mean of several individuals similarly trained and supervised; (3) differences in individual estimations within a type compensate to the extent that they are overshadowed by the natural variation in plant cover, indicating that for determination of grazing capacity the estimate of all vegetation made by a single individual may be as reliable as averages from several estimators; (4) there is a high negative correlation between average density of a species and the variation of individuals in estimating that species on a plot; and (5) the error introduced by recording minor species could be materially lessened by grouping such species and that disregarding all but the 15 or 20 most important species in a single management unit would probably introduce no greater error than occurs by the inclusion of secondary species.

PLANS FOR NEXT YEAR: Complete analysis of field data collected during 1937. Dependent upon results of this analysis, to extend the study to other forage types, with special emphasis on developing methods for future management studies.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Pickford and Reid.

DEVELOP METHODS OF MANAGING SUMMER RANGES IN MOUNTAINOUS REGIONS OF THE WEST (WESTERN OREGON AND WASHINGTON)

FIELD DIVISION: Range.

WORK PROJECT: Grazing Management.

FUNCTIONAL PROJECT: Grazing Management.

LINE PROJECT: Develop Methods of Managing Summer Ranges in Mountainous Regions of the West (Western Oregon and Washington).

PURPOSE OF WORK: A study of the grazing possibilities on burned or logged lands in the Douglas fir region.

REVIEW OF PAST WORK: From 1924 to 1935 a detailed study was made of grazed sample plots on logged and burned areas in the Wind River valley. Early results (1925-27) of this phase of the study are covered by various file reports and a J.A.R. article in 1931, "Vegetative Changes and Grazing Use on Douglas Fir Cut-Over Lands", by D. C. Ingram. In recent years (1928-35) the study was carried on by the Division of Silvics.

ACCOMPLISHMENTS DURING PAST YEAR: Analysis of data from the Wind River plots for the 11-year period (1925-35) has been completed and results of the analysis are now available in manuscript form.

PLANS FOR NEXT YEAR: None.

DATE OF COMPLETION: No further studies on vegetative changes under grazing use are anticipated until ample funds and personnel are available. Economic phases of the project will be carried for the present by the Division of Economics.

ASSIGNMENT: Pickford and Reid.

COOPERATIVE WESTERN RANGE SURVEY

FIELD DIVISION: Range

WORK PROJECT: Grazing Management

FUNCTIONAL PROJECT: Grazing Management

LINE PROJECT: Cooperative Western Range Survey

PURPOSE OF WORK: In cooperation with agencies of the U. S. Departments of Agriculture and Interior that have jurisdiction in range matters or of range lands, to determine on a county basis from range surveys in Oregon and Washington already made or which may be made, (1) acreage and grazing capacity of vegetative types and subtypes and (2) nature, cause, and logical solution of major range problems.

REVIEW OF PAST WORK: Project was started March 31, 1937 under memorandum of understanding of that date and terminating March 1, 1938.

ACCOMPLISHMENTS DURING PAST YEAR: Maps and reports were prepared covering 2,200,659 acres in Morrow (Oregon) and Kittitas (Washington) Counties of which 70 percent is range, 30 percent is cultivated land or farm pasture. Aside from general range deterioration due to overstocking accentuated by drought, major range problems were shown to be (1) uneven livestock distribution owing to an inadequate number and an uneven distribution of watering places, (2) forage depletion from continuous or recurrent grazing during the period of rapid plant growth, (3) localized denudation and depletion from bedding for long periods at corrals or bed grounds, (4) heavy use of driveways, and (5) in some instances grazing during the wrong season or with the wrong class of livestock. Corrective practices recommended are (1) reduction to grazing capacity, (2) a planned water development program, (3) deferred and rotation grazing, (4) proper methods of bedding and salting, (5) trucking between seasonal ranges instead of trailing, and (6) grazing during the proper season with the class of stock best suited to the range.

PLANS FOR NEXT YEAR: Dependent on extension of present memorandum of understanding.

DATE OF COMPLETION: Present phase is to be completed March 1, 1938.

ASSIGNMENT: Pickford.

RP - NW
Mill Studies

Continued

February 1938

MILL PRODUCTION STUDIES

FIELD DIVISION: Products

WORK PROJECT: Timber Harvesting and Conversion Investigations.

FUNCTIONAL PROJECT: Timber Harvesting and Conversion Investigations.

LINE PROJECT: Mill Production Studies

PURPOSE OF WORK: The development and furtherance of sound milling practice as a means to sustained yield management, better silviculture, and more efficient utilization.
A. In the Douglas Fir Region. B. In the Ponderosa Pine Region.

REVIEW OF PAST WORK: A. Grade production studies completed in several large Douglas fir mills. Reports prepared.
Sawing time and grade production studies made in several small (under 100 M) Douglas fir mills. Results awaiting analysis.

B. Grade production studies, using a new series of log grades completed in 3 large mills. Reports prepared on one, partially completed on two.

ACCOMPLISHMENTS DURING PAST YEAR: A. Sawing time studies made in 5 small Douglas fir mills. Data not analyzed.
B. Intensive production studies made in two large mills at Bend, Oregon. Field work completed; office compilation begun. Intensive sawing time study made in one pine mill. Reports well advanced for two of last year's studies. Kinzua data adjusted to the lumber prices and costs obtaining in October, 1937. Plans provided for study to be conducted by Southwestern Station at Flagstaff, Arizona mill. Office compilations begun for this study.

PLANS FOR NEXT YEAR: A. Continue field work on time studies in small mills. Complete analysis of past data.
B. Complete office analysis of studies under way. Combine the 5 mills already studied to bring out points of similarity and points where additional data are needed.

DATE OF COMPLETION: Continuous project. A. and B. under "Accomplishments" to be completed during 1938.

ASSIGNMENT: Lodewick, Johnson, Anderson.

WOODS AND MILL UTILIZATION

FIELD DIVISION: Products.

WORK PROJECT: Timber Harvesting and Conversion Investigations.

FUNCTIONAL PROJECT: Timber Harvesting and Conversion Investigations.

LINE PROJECT: Woods and Mill Utilization.

PURPOSE OF WORK: The development and furtherance of sound utilization practices in Oregon and Washington.

A. Reduction and utilization of mill and woods waste.

B. Harvesting and marketing of farm timberland and products.

C. Relation between wood supply and industrial development in wood-using industries.

REVIEW OF PAST WORK: A. Inventory of woods and mill waste completed, including reports.

B. Bibliography completed. One article published.

C. Two reports on pulp industry requirements and source of wood supply prepared.
Memorandum on changes in plywood industry prepared.

ACCOMPLISHMENTS DURING PAST YEAR:

A. Report on use of power saws in Douglas fir region prepared at request of Pacific Logging Congress.

B. No work done.

C. No work done.

PLANS FOR NEXT YEAR:

A and C. Collect current data as time and opportunity permit.

B. Continue in cooperation with Division of Forest Management.

DATE OF COMPLETION: Continuous project.

ASSIGNMENT: Johnson, Lodewick.

SPECIES AND PRODUCTS UTILIZATION

FIELD DIVISION: Products

WORK PROJECT: Timber Harvesting and Conversion Investigations

FUNCTIONAL PROJECT: Timber Harvesting and Conversion Investigations

LINE PROJECT: Species and Products Utilization

PURPOSE OF WORK: Analysis of the factors affecting the use of minor species and so-called minor products.
A. Minor Species Utilization B. Minor Products Utilization

REVIEW OF PAST WORK:

A. Data accumulated and published on red alder, bigleaf maple, Oregon white oak, and black cottonwood. Miscellaneous data collected for other species.
B. Measurements made and reports published on solid contents of pulpwood and on yields for trees of different sizes.
Plans completed for cooperation with Forest Products Laboratory on cascara bark yields, production and utilization.

ACCOMPLISHMENTS DURING PAST YEAR: A. A few data collected.
B. Nothing done.

PLANS FOR NEXT YEAR: A and B. Continue collection of data as and if funds and personnel permit.

DATE OF COMPLETION: Continuous project.

ASSIGNMENT: Johnson and Lodewick.

STATISTICAL STUDY OF PRODUCTION; USE AND PRICE TRENDS OF P.N.W. FOREST PRODUCTS

FIELD DIVISION: Products

WORK PROJECT: Forest Products Statistics

FUNCTIONAL PROJECT: Forest Products Statistics

LINE PROJECT: Statistical Study of Production; Use and Price Trends of P.N.W. Forest Products.

PURPOSE OF WORK: To collect, summarize, and distribute all available statistics on the forest products of Oregon and Washington.
A. Minor Products. B. Census. C. Cutting Depletion and Requirements Phases of Forest Survey.

REVIEW OF PAST WORK: A. Report on minor forest products, their production and use completed in 1931. Additional and supplementary data compiled since then.
B. Annual census of lumber, lath, shingle, and log production for past years completed.
Report on distribution of Oregon and Washington lumber 1920-1934 published.
C. West side cutting depletion 1925-33 completed; east side 1925-1929, by years complete. Urban dwelling and garage requirements, urban repairs and alteration requirements, and farm fencing requirements complete. Part of field work on farm building requirements completed.

ACCOMPLISHMENTS DURING PAST YEAR: A. General and supplementary information on minor products collected. Price charts kept current.
B. Collected lumber, lath, shingle and log census for 1936 in cooperation with Bureau of the Census, 1936. Log export data tabulated and released. Log and shingle prices for 1936 prepared and released.
C. Field work on farm building requirements completed. Report partially prepared.

PLANS FOR NEXT YEAR: A. Continue collection of data as time and funds permit. B. Complete 1937 census. C. Complete farm building requirements report.

DATE OF COMPLETION: A. and B. Continuous Projects.
C. Complete during calendar year 1938.

ASSIGNMENT: A. Johnson. B. Johnson. C. Lodewick.

Continued

February 1938

STUDIES ON THE PROPERTIES OF WEST COAST WOODS

FIELD DIVISION: Products

WORK PROJECT: Seasoning and Physical Properties Investigation

FUNCTIONAL PROJECT: Seasoning and Physical Properties Investigation

LINE PROJECT: Studies on the Properties of West Coast Woods

PURPOSE OF WORK: To carry on investigations in cooperation with and supplementing those of the Forest Products Laboratory. A. Identification of Woods and Fibers. B. Properties of Pacific Northwest Woods. C. Wood Durability and Preservation. D. Deterioration of Fire-killed Timber.

REVIEW OF PAST WORK:

A. Routine identifications done. Articles published on wood and wood fiber identification.
B. No work done.
C. Work plans completed. Data on all arsenic-paste treated lines in R-6 forests compiled. Eleven lines selected for periodic examination.
D. Investigation made on burns in the Douglas fir region. Report prepared. Digest published.

ACCOMPLISHMENTS DURING PAST YEAR:

A. Routine Identifications. Article on wood identification published in trade journal.
B. No work done.
C. Eleven lines established for periodic examination. Poles numbered and described. Report in preparation. Data on all new installations of arsenic-treated lines kept current.
D. No work done.

PLANS FOR NEXT YEAR: A. Continue routine. B. No work contemplated.

C. Conduct second inspection of lines in Oregon and prepare report. Keep data on installations current.
D. No work contemplated.

DATE OF COMPLETION:

A. B. C. D. - - Continuous Projects

ASSIGNMENT:

A. Lodewick. B. Lodewick and Anderson.
C. Anderson. D. None needed.

FOREST SURVEY OF DOUGLAS FIR REGION

FIELD DIVISION: Forest Survey

WORK PROJECT: Forest Survey

FUNCTIONAL PROJECT: Forest Survey

LINE PROJECT: Forest Survey of Douglas Fir Region

PURPOSE OF WORK: To make a comprehensive survey of the forest resources of this region, including an inventory of existing forests, study of forest depletion from all causes, a determination of current and potential forest growth, a study of requirements for forest products, and an economic analysis of these data.

REVIEW OF PAST WORK: Original field and office work completed for all phases. Basic statistical data for inventory and growth studies published by county and State. One-inch-to-the-mile county type maps and $\frac{1}{4}$-inch-to-the-mile lithographed State type maps published and distributed for the entire region. Many special requests for statistical data filled.

ACCOMPLISHMENTS DURING PAST YEAR: Douglas fir regional report, which analyzes the findings of the forest survey and correlates them with other economic data, completed in manuscript form, edited, and sent to Washington. The original inventory of Clatsop County, Oregon, and Grays Harbor County, Washington, was brought up to date by field examination. Compilation of revised forest type areas and timber volumes for these two counties now under way.

PLANS FOR 1938: Make any revisions necessary in regional report before publication. Continue inventory revision by field work in western Oregon and western Washington counties.

DATE OF COMPLETION: Expect to bring up to date inventory of six counties during 1938.

ASSIGNMENTS: Andrews, Cowlin, and assistants.

FOREST SURVEY OF PONDEROSA PINE REGION

FIELD DIVISION: Forest Survey

WORK PROJECT: Forest Survey

FUNCTIONAL PROJECT: Forest Survey

LINE PROJECT: Forest Survey of Ponderosa Pine Region

PURPOSE OF WORK: To make a comprehensive survey of the forest resources of this region, including an inventory of existing forests, study of forest depletion from all causes, a determination of current and potential forest growth, a study of requirements for forest products, and an economic analysis of these data.

REVIEW OF PAST WORK:

Inventory phase: Field work completed, total forest area covered 24.7 million acres. Type area and timber volume data compiled. County statistical reports issued for all forested counties. 1-inch-to-the-mile type maps published for all forested counties. $\frac{1}{4}$-inch-to-the-mile lithographed type maps published for all the region except northeastern Oregon.

Depletion phase: Data for fire and cutting depletion collected in the field and compiled.

Growth phase: Field work necessary to estimate current, periodic, and potential growth completed. Computation of net increment in the immature types about 75 percent complete.

ACCOMPLISHMENTS DURING PAST YEAR: Completion of basic inventory computations. Publication of forest statistics for 10 counties and 1-inch-to-the-mile type maps for 4 counties. Publication and distribution of lithographed type maps for southeastern Oregon and northeastern Washington. Copy for map of northeastern Oregon completed and forwarded to Washington. Computation of cutting and fire depletion data. Progress in computing forest growth. Publication of inventory statistics for national forests of Region 6.

PLANS FOR 1938. Publish inventory statistics for region. Complete growth phase computations. Correlate depletion data with growth. Prepare State and regional comprehensive reports.

DATE OF COMPLETION: Growth phase complete by June 1. State reports July 1. Regional report in first draft December 31.

ASSIGNMENTS: Andrews, Cowlin, and assistants.

RELATION OF TAX-REVERTED LAND AND FOREST COVER TO LAND UTILIZATION IN DOUGLAS FIR REGION AS BASIS FOR FORMULATION OF POLICY TO DEAL WITH PROBLEM

FIELD DIVISION: Economics

WORK PROJECT: New Public Domain Investigations

FUNCTIONAL PROJECT: Land Economics

LINE PROJECT: Relation of Tax-reverted Land and Forest Cover to Land Utilization in Douglas Fir Region as Basis for Formulation of Policy to Deal with Problem

PURPOSE OF WORK: (a) To study the effects, causes, and possible cures of unstable forest-land ownership in western Oregon and western Washington and (b) to apply principles developed to representative cases, including cooperation with other agencies.

REVIEW OF PAST WORK: Field and office computations for generalized study practically completed, progress reports published, and writing of general report well under way. Cooperated broadly with regional, State, and local agencies on remedial legislation, plans for handling tax-delinquent and forfeited lands, plans for handling other forest lands, land classification and rural zoning.

ACCOMPLISHMENTS DURING PAST YEAR: Brought field and office computations and analysis almost to completion and progressed with writing report, continued cooperation referred to under (b), including Pacific Northwest Regional Commission report on regional forest problems, Resettlement Administration classification of rural lands in Coos and Tillamook Counties, State Tax Commission of Oregon on laws affecting tax-delinquency procedure, Governor of Oregon's Special Timber Taxation Committee on State assessment of forest lands and State acquisition and disposal of tax-forfeited lands.

PLANS FOR NEXT NEAR: (1) Complete general report. (2) Complete analysis and report on the relation of forest cover to tax delinquency, detailed for specialized use. (3) Complete studies of principles affecting zoning of forest lands in western Oregon and western Washington. (4) Complete digest and analysis of tax and land laws of Oregon and Washington affecting owners of forest property, with particular attention to weaknesses, conflicts, and desirable changes. (5) Initiate application phase of study (see item (b) under Purpose of Work).

DATE OF COMPLETION: Items (1), (2), and (3) in 1938. Item (4) in 1938 and 1939. Item (5) 1940-41.

ASSIGNMENT: S. A. Wilson and Wade DeVries.

RE-NW
Forest Land Economics
NPD - E. Oreg. and E. Wash.

Closed

February 1938

TAX DELINQUENCY AND ABANDONMENT OF FOREST-RANGE LANDS - PONDEROSA PINE REGION

FIELD DIVISION: Economics.

WORK PROJECT: New Public Domain Investigations.

FUNCTIONAL PROJECT: Land Economics.

LINE PROJECT: Tax Delinquency and Abandonment of Forest-Range Lands - Ponderosa Pine Region.

PURPOSE OF WORK: To study the effects, causes and possible cures of unstable forest and range land ownership in eastern Oregon and eastern Washington.

REVIEW OF PAST WORK: New, except for examination of reports of other agencies pertaining to extent of tax delinquency and minor computations.

ACCOMPLISHMENTS DURING PAST YEAR: No work undertaken.

PLANS FOR NEXT YEAR: Closed for lack of funds.

RE-NW
Forest Land Economics
NPD - W. Oreg. and W. Wash.
(Forest Land Classification)

Continued

February 1938

BASES FOR DETERMINING HIGHEST USES OF LANDS IN COAST COUNTIES

FIELD DIVISION: Economics.

WORK PROJECT: New Public Domain Investigations.

FUNCTIONAL PROJECT: Land Economics.

LINE PROJECT: Bases for Determining Higher Uses of Land in Coast Counties.

PURPOSE OF WORK: To study (a) the means and costs by which present forest cover could be converted to and maintained in forage; (b) the effect of such conversion upon soil erosion and water run-off; (c) the effect of fire employed in attempting such conversion upon soil and vegetation; (d) the economic considerations which would justify the expenditures necessary to convert forest land to grazing; (e) practical multiple uses of forest lands such as commercial timber, grazing, wild life, recreation.

REVIEW OF PAST WORK: New, except for general observations. The Oregon State Agricultural Experiment Station has conducted general studies on costs of clearing stump lands for farm purposes and engaged in 1937 with the State Board of Forestry in a study of the adaptability of different grasses to logged and recently burned forest lands, and of these seeded lands to beef cattle grazing.

ACCOMPLISHMENTS DURING PAST YEAR: Prepared working plans for a study of fire effects and made cursory observations in the early summer and late fall of the results of seeding cut-over forest lands in Coos County. Cooperated with the Resettlement Administration in the classification of rural lands in Coos and Tillamook Counties, Oregon, and with the Washington State Agricultural Experiment Station in the classification of rural lands in Kitsap County and in economic land-surveys in the several counties of Washington.

PLANS FOR NEXT YEAR: Examination and designation of areas in which long-term experiments should be conducted and development of preliminary working plans.

DATE OF COMPLETION: Certain phases in 2 or 3 years, others in 15 years, others indefinite.

ASSIGNMENT: S. A. Wilson with collaboration of Division of Silvics, Range, and Forest Survey, Regional Forester's office, and Forest Supervisor.

ANALYSIS OF EXISTING AND PROPOSED FOREST TAX LAWS

FIELD DIVISION: Economics.

WORK PROJECT: Taxation Investigations.

FUNCTIONAL PROJECT: Land Economics.

LINE PROJECT: Analysis of Existing and Proposed Forest Tax Laws.

PURPOSE OF WORK: (1) To analyze and report upon the soundness of existing and proposed forest tax legislation. (2) To cooperate with the Regional Forester's office in their promotional work in connection with forest taxation legislative proposals. (3) To analyze the results and report upon the operation of existing special forest tax laws.

REVIEW OF PAST WORK: Criticisms and reviews of the following: (1) Oregon State Planning Board's reports on the deferred timber tax, (2) Prof. Donald Matthews' advocacy of frozen assessments and the prepaid yield tax, (3) the Washington so-called deferred timber tax (Hedges) bill, (4) proposed amendments to the Washington yield tax (reforestation) law, (5) Oregon Governor's Timber Taxation Committee proposals for State assessment of forests, (6) Idaho law regarding taxation in cooperative sustained yield districts.

ACCOMPLISHMENTS DURING PAST YEAR: There was little activity in this project due to the fact that the legislatures were not in session or were practically at the end of their 1937 session. Work on items (2), (3), and (4) of paragraph 6 above was continued. Memoranda were made on observations regarding the operation of the yield tax law of Washington.

PLANS FOR NEXT YEAR: Largely dependent upon legislative activities of other agencies. An investigation of the operation of the yield tax law in Clatsop County where there is some opposition to it may be undertaken.

DATE OF COMPLETION: Continuing and indefinite.

ASSIGNMENT: DeVries.

APPLICATION OF PRINCIPAL RECOMMENDATIONS OF FOREST TAXATION INQUIRY TO SELECTED COUNTIES

FIELD DIVISION: Economics.

WORK PROJECT: Taxation Investigations.

FUNCTIONAL PROJECT: Land Economics.

LINE PROJECT: Application of Principal Recommendations of Forest Taxation Inquiry to Selected Counties.

PURPOSE OF WORK: (1) To explore the possibilities of reducing the absolute burden of the property tax and of making the tax burden on forests more predictable, through the reorganization of local government in thickly settled areas and its partial disorganization in sparsely settled areas, and through improving the financial practices of local government units. (2) To study the administration of the property tax with special reference to assessment and collection.

REVIEW OF PAST WORK: New in 1937.

ACCOMPLISHMENTS DURING PAST YEAR: Conducted studies in Skamania and Pacific County, Washington, and prepared 50-page office reports on each county. Prepared 1936 assessed valuation maps, ownership and ownership classification maps for Skamania and Pacific Counties. Initiated studies in Clallam County, Washington.

PLANS FOR NEXT YEAR: Complete the studies undertaken in the three Washington Counties and pursue similar studies in three Oregon counties to be selected. Write office reports on the results of the studies in each county and prepare a final report for each State, analyzing the results obtained and conclusions drawn from studies in the selected counties.

DATE OF COMPLETION: July 1939.

ASSIGNMENT: DeVries.

SELECTIVE TIMBER MANAGEMENT IN DOUGLAS FIR

FIELD DIVISION: Economics

WORK PROJECT: Private Forestry Investigations

FUNCTIONAL PROJECT: Logging Economics

LINE PROJECT: Selective Timber Management in Douglas Fir

PURPOSE OF WORK: Develop through production-cost studies and financial analyses improved methods of cutting Douglas fir and associated species that are economically sound and technically desirable from forest land-use standpoint.

REVIEW OF PAST WORK: First phase completed in 1933 with publication of a bulletin by Brandstrom entitled "Analysis of Logging Costs and Operating Methods in the Douglas Fir Region." Second phase completed in 1935 and published in the form of a comprehensive report, "Selective Timber Management in the Douglas Fir Region", by Kirkland and Brandstrom.

ACCOMPLISHMENTS DURING PAST YEAR: Survey and marking of timber on 280-acre area on operations of the West Fork Logging Company at Mineral, Washington, in preparation for experiments in and demonstration of light selective cutting and small-group selection with donkeys and tractors. Experiments planned for 1937 but through unforeseen events postponed till 1938.

PLANS FOR NEXT YEAR: (1) To cooperate in logging experiments planned by the West Fork Logging Company; to make other studies on the same operation as a basis for planning sustained-yield forestry; and to extend similar cooperation to other private operations with whom satisfactory arrangements can be made. (2) To undertake, if personnel is available, a series of time and cost studies of logging to bring information up to date and to check on some of the methods studied in 1931 and 1932. (3) To cooperate with regional office in connection with experimental timber sales on national forests designed to test and demonstrate principles of selective management.

DATE OF COMPLETION: (1) 1938. (2) 1939. (3) Indefinite.

ASSIGNMENT: Brandstrom and temporaries (if available).

SELECTIVE TIMBER MANAGEMENT IN PONDEROSA PINE

FIELD DIVISION: Economics.

WORK PROJECT: Private Forestry Investigations.

FUNCTIONAL PROJECT: Logging Economics.

LINE PROJECT: Selective Timber Management in Ponderosa Pine.

PURPOSE OF WORK: Develop through production-cost studies and financial analysis improved methods of cutting ponderosa pine that are economically sound and technically desirable from forest land-use standpoint.

REVIEW OF PAST WORK: Project begun in 1935 and continued through 1936 and 1937. Time and cost studies of various phases of logging have been made on 8 different operations in eastern Oregon. A comprehensive case study covering all phases of timber management for more than half a million acres of national forest land in the area tributary to Burns, Oregon, was made in 1935 and 1936 and led to a radical change from heavy to light selective cutting under a system that has been named "maturity selection." Three similar comprehensive case studies have since been made, of which two are still under way.

ACCOMPLISHMENTS DURING PAST YEAR: Completion, except for final report writing, of two comprehensive case studies in eastern Oregon. Analysis of results of a 40 percent maturity selection cut on a 10,000-acre experimental area on the Malheur National Forest, carried out along the lines recommended in the Burns study of 1936. Demonstration cuttings of 20, 40, and 60 percent maturity selection on a 520-acre area on the Pringle Falls Experimental Forest. Demonstration marking for 50 percent maturity selection on a 120-acre sample area on the operations of the Brooks-Scanlon company and on a 400-acre sample area of the J. Neils Lumber Company. Cooperation with the Southwestern Experiment Station in planning and starting a comprehensive case study on the Coconino National Forest.

PLANS FOR NEXT YEAR: Complete office reports on two comprehensive case studies in eastern Oregon and on the cooperative study on the Coconino National Forest in Arizona. Prepare for publication, in cooperation with other Station divisions, comprehensive bulletin on selective timber management in ponderosa pine embodying the findings and conclusions of the studies conducted from 1935 to the present.

(over)

Cooperation with Regional Office in timber appraisal work based on findings of the studies. Continuation and analysis of Pringle Falls cutting experiments. Cooperation and promotional contacts with private operators.

DATE OF COMPLETION: Report writing on studies now completed or under way and preparation of bulletin to be completed during 1938.

ASSIGNMENT: Brandstrom.

STUDY OF MOTOR TRUCK HAULING IN OREGON AND WASHINGTON

FIELD DIVISION: Economics

WORK PROJECT: Private Forestry Investigations

FUNCTIONAL PROJECT: Logging Economics

LINE PROJECT: Study of Motor Truck Hauling in Oregon and Washington

PURPOSE OF WORK: To collect and analyze data on costs and methods of hauling logs by motor trucks operated on public and private roads, and to study their effect on logging methods and forest management. Developments in motor truck log transportation are bringing about revolutionary changes in the woods operations of Oregon and Washington which are of extraordinary significance in forest management.

REVIEW OF PAST WORK: Initial project completed by Rapraeger in 1932, with publication of various trade-journal articles in 1933 and 1934. Project resumed in 1936 with collection of data on four truck operations in western Oregon.

ACCOMPLISHMENTS DURING PAST YEAR: None, owing to lack of personnel.

PLANS FOR NEXT YEAR: Contingent on availability of time and personnel, to collect and analyze field data and to prepare reports and trade-journal articles for dissemination of findings.

DATE OF COMPLETION: 1939.

ASSIGNMENT: Brandstrom.

DESIGN AND DEVELOPMENT OF "FORESTRY DESIGNED" LOGGING MACHINERY AND METHODS

FIELD DIVISION: Economics

WORK PROJECT: Private Forestry Investigations

FUNCTIONAL PROJECT: Logging Economics

LINE PROJECT: Design and Development of "Forestry Designed" Logging Machinery and Methods

PURPOSE OF WORK: To aid in the development of logging machinery and methods that would contribute toward better forest management, specifically toward reduction of timber breakage and of damage to residual stands, reproduction, or the land, and toward greater flexibility and selectivity in logging. Motorization of logging, as represented by recent rapid advances and developments in the use of trucks and tractors has prepared a fertile field for specific adaptation of machinery to the needs of forestry.

REVIEW OF PAST WORK: (See accomplishments during past year.)

ACCOMPLISHMENTS DURING PAST YEAR: Project proposed and accepted at 1937 investigative meeting and assigned to three-man committee, two from the regional office and one from the experiment station. Forest Service Equipment Laboratory engineers were engaged by committee to study field conditions under which tractor logging is done, and to prepare preliminary designs of a logging tractor adapted for carrying large loads without the use of trailer (arch), and for other modifications of design of present tractor machinery that will promote better forestry practice in the use of tractors. Preliminary sketches and designs under preparation.

PLANS FOR NEXT YEAR: To continue work begun last year until satisfactory machinery designs are worked out. To cooperate with private operators in experiments with present types of machinery and methods designed to promote better forestry practice.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Brandstrom (chairman of committee); Wright and Flynn of regional office.

 February 1938

FLOOD CONTROL SURVEYS

FIELD DIVISION: Influences

WORK PROJECT: Flood Control Surveys

FUNCTIONAL PROJECT: Flood Control Surveys

LINE PROJECT: Flood Control Surveys

PURPOSE OF WORK: To make investigations for run-off and waterflow retardation and soil-erosion prevention on watersheds as specified by the flood control act of 1936 as amended.

REVIEW OF PAST WORK: New project - 1937.

ACCOMPLISHMENTS DURING PAST YEAR: Conferences with representatives of Bureau of Agricultural Economics and Soil Conservation Service to discuss outline for preliminary flood-control reports, assignment of parts of outline, and priorities as to watersheds. In cooperation with B.A.E. and S.C.S., preliminary report for Lewis River watershed, Washington, completed. First drafts of preliminary reports for Walla Walla and Chehalis River watersheds prepared. Some work done on Skagit and Nootsack River watersheds. Seventeen joint public flood-control hearings held in cooperation with U. S. Army Engineers.

PLANS FOR NEXT YEAR: Complete Walla Walla, Chehalis, Skagit, and Nootsack reports. Start work on Willamette. Work after July depends on action of Congress.

DATE OF COMPLETION: See above.

ASSIGNMENT: Andrews, Bolles, and Dunford in cooperation with representatives of B.A.E. and S.C.S.